MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2018/2019

BFN3174 – FINANCIAL MODELLING

(All sections / Groups)

8 MARCH 2019
9.00 a.m. - 11.00 a.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of **17** pages.
2. Answer **ALL FOUR** questions in **FOUR SEPARATE** Excel spreadsheets in **ONE SINGLE** Excel file.
3. Your Excel file should be named with your **STUDENT ID**, followed by your **NAME**, for example: **1111111623_HISHAM.xls**
4. **SAVE** your answers for all questions in the provided **THUMB-DRIVE.**
5. Please also copy your answers together with formulas onto the given templates of Excel spreadsheets in the **APPENDIX.**
6. Mark distributions are shown in the given templates.

Using the templates provided in the Appendix of this question paper to model the following 4 questions in the Microsoft Excel:

QUESTION 1 (25 MARKS)

You are considering a project with the cash flows given below.

Year	Cash Flow
0	-1,000
1	500
2	650
3	700
4	800
5	850
6	900

a. Calculate the present values of the future cash flows of the project, given interest rate is 15%. **(6 marks)**

b. Calculate the project's net present value (NPV) by using results obtained in (a) and by using the Excel's NPV formula. **(6 marks)**

c. Calculate the project's internal rate of return (IRR). **(5 marks)**

d. Using "IF function" to model the investment decision for this project based on both NPV and IRR results. **(8 marks)**

QUESTION 2 (25 MARKS)

a. Use the Black-Scholes model to price a put option on a stock with the following information:

Current stock price (S) = 30

Exercise price (X) = 25

Time to maturity (T) = 0.75

Risk-free rate (r) = 10%

Standard deviation (sigma) = 30%

(10 marks)

Continued...

b. Produce data-tables that show:

(i) the sensitivity of the Black-Scholes call price to changes in the exercise price, S. **(5 marks)**

(ii) the sensitivity of the Black-Scholes call price to changes in the time to maturity, T. **(5 marks)**

(ii) the sensitivity of the Black-Scholes call price to changes in the stock volatility, standard deviation (sigma). **(5 marks)**

Note: please refer to the templates given in the Appendix for this question.

QUESTION 3 (25 MARKS)

On 1/01/2019, you are offered the following bond:

Face value	: RM1,000
Coupon rate	: 10%
Coupon payments	: 2 time per year, i.e. 1/06/2019, 1/12/2019, ...
Bond price	: RM1,030
Maturity date	: 1/12/2020

a. Compute the bond's yield to maturity (YTM) using YIELD formula. **(5 marks)**

b. Compute the duration of the bond. **(5 marks)**

c. If interest rate increases by 2%, what would be the approximate change in the bond's price? Using the bond's duration to estimate this change. **(5 marks)**

d. Carry out sensitivity analysis for the bond's duration to changes of the coupon rate from 5% to 15%. **(10 marks)**

Continued...

QUESTION 4 (25 MARKS)

You receive a RM15,000 signing bonus from your new employer and decide to invest it for 10 years. Your banker suggests two options, which both require a commitment for the full 10 years. The first option will earn 8% per year. The second option earns 10% for the first 5 years, and 6% for the last 5 years. Interest compounds annually.

a. Compute the future cash flows over the period of 10 years for the first and the second options. **(10 marks)**

b. Using "IF function" to model the investment decision between option 1 and option 2. **(5 marks)**

c. Carry out two different sensitivity analyses for the future value of option 2's investment at year 10, when there are changes in interest rates during the first and the second 5-year period. **(10 marks)**

End of Page

APPENDIX: TEMPLATES FOR ALL QUESTIONS

The given templates in this Appendix are:

1. to be followed exactly when carrying out your modeling in the Microsoft Excel for all of the four given questions.

2. to be used to record answers produced in your Excel spreadsheets for all of the four given questions as follows:

   - Each resulted value should be recorded on the correct cell as it appears on your actual excel spreadsheet in the Microsoft Excel.

   - Formula for each recorded value should be recorded in the 'Excel Formula' column.

   - Formulas for more than one columns can be entered in one single excel cell under the Excel-Formula column and spaced from one another with a slash sign "/".

ANSWER FOR QUESTION 1 (25 MARKS):

	A	B	C	D	E
1	**INPUT ZONE**				
2	Interest rate				
3					
4	**MODELLING ZONE**				
5	1a. (6 marks)				
6	**Year**	**Cash Flow**	**Present Value**	Excel Formula Column	
7	0				
8	1				(1 mark)
9	2				(1 mark)
10	3				(1 mark)
11	4				(1 mark)
12	5				(1 mark)
13	6				(1 mark)

ANSWER FOR QUESTION 1 (25 MARKS) (CONTINUED...):

	A	B	C	D	E
14					
15	1b. (5 marks)				
16	NPV				(3 marks)
17					(3 marks)
18	1c. (5 marks)				
19	IRR				(5 marks)
20					
21	1d.				
22	Decision				(4 marks)
23					(4 marks)
24					

ANSWER FOR QUESTION 2 (25 MARKS):

	A	B	C	D
1	**INPUT ZONE**			
2	Stock Price (S)			
3	Exercise Price (X)			
4	Risk-free rate (r)			
5	Time to Maturity (years) (T)			
6	Standard deviation (Sigma)			
7				
8	**MODELLING ZONE**		**EXCEL FORMULA**	
9	d_1			(2 marks)
10	d_2			(2 marks)
11				
12	$N(d_1)$			(2 marks)
13	$N(d_2)$			(2 marks)
14				
15				(2 marks)
16	Put price			
17				

ANSWER FOR QUESTION 2 (25 MARKS) (CONTINUED...):

	A	B	C	D
19	SENSITIVITY ANALYSIS			
20	Stock price	Put Price	EXCEL FORMULA	
21				(2 marks)
22	5			(3 marks)
23	10			
24	15			
25	20			
26	25			
27	30			
28	35			
29	40			
30	45			
31	50			
32	55			
33				

ANSWER FOR QUESTION 2 (25 MARKS) (CONTINUED...):

	A	B	C	D
34	Time to Maturity	Put Price	EXCEL FORMULA	
35				(2 marks)
36	0.30			(3 marks)
37	0.50			
38	0.75			
39	0.90			
40				
41				
42	Standard Deviation	Put Price	EXCEL FORMULA	
43				(2 marks)
44	5%			(3 marks)
45	10%			
46	15%			
47	20%			
48	25%			
49	30%			
50	35%			
51	40%			
52	45%			
53	50%			
54	55%			

ANSWER FOR QUESTION 3 (25 MARKS):

	A	B	C	D
1	**INPUT ZONE**			
2	Face value (RM)			
3	Coupon Rate			
4	Coupon payment per year			
5	Bond price (RM)			
6	Issuance date			
7	Maturity date			
8				
9	**MODELLING ZONE**		**EXCEL FORMULA TO BE RECORDED IN THIS COLUMN**	
10	**1a.**			
11	Coupon payment per year			(1 mark)

ANSWER FOR QUESTION 3 (25 MARKS) (CONTINUED...):

	A	B	C	D
13	**Date**	**Cash Flows**		
14	01/01/2019			(1 mark)
15	01/06/2019			(1 mark)
16	01/12/2019			
17	01/06/2020			
18	01/12/2020			(1 mark)
19				
20				
21	**YTM**			(1 mark)
22				
23	1b.			
24	**DURATION**			(5 marks)
25				
	1c.			
27	**Change in interest rate**			
28	**Potential Change in the Bond's Price**			(5 marks)
29				

ANSWER FOR QUESTION 3 (25 MARKS) (CONTINUED...):

	A	B	C	D
30	1d.			
31	**SENSITIVITY ANALYSIS**			
32				
33	**Coupon rate**	**Duration**		
34				(5 marks)
35	5%			(5 marks)
36	6%			
37	7%			
38	8%			
39	9%			
40	10%			
41	11%			
42	12%			
43	13%			
44	14%			
45	15%			
46				

ANSWER FOR QUESTION 4 (25 MARKS):

	A	B	C
1	**INPUT ZONE**		
2	Investment amount (RM)		
3	Option #1: Interest rate over the 10 years' period		
4			
5	Option #2: Interest rate over the first 5 years' period		
6	Option #2: Interest rate over the last 5 years' period		
7			

ANSWER FOR QUESTION 4 (25 MARKS) (CONTINUED...):

	A	B	C	D
8	**MODELLING ZONE**			
9	4a.			
10	**OPTION #1**			
11				
12	**Year**	**Cash Flow**	**Excel Formula**	
13	1			
14	2			
15	3			
16	4			
17	5			
18	6			
19	7			
20	8			
21	9			
22	10			(5 marks)

ANSWER FOR QUESTION 4 (25 MARKS) (CONTINUED...):

	A	B	C	D
24	**OPTION #2**			
25				
26	**Year**	**Cash Flow**	**Excel Formula**	
27	1			
28	2			
29	3			
30	4			
31	5			
32	6			
33	7			
34	8			
35	9			
36	10			(5 marks)
37	4b.			
38	Decision			(5 marks)
39	4c.			

ANSWER FOR QUESTION 4 (25 MARKS) (CONTINUED…):

	A	B	C	D
39	4c.			
40	Sensitivity Analysis			
41				
42	**Interest Rate for the first 5 years**	**Year 10 Cash Flow under Option 2**	**Excel Formula**	
43				
44	5%			
45	6%			
46	7%			
47	8%			
48	9%			
49	10%			(5 marks)